

APPLICATION

of

**HOWARD M. THOMSON**

for

LETTERS PATENT OF THE UNITED STATES

for

CORROSION RESISTANT PRESTRESSED CONCRETE FLOAT SYSTEM

LUEDEKA, NEELY & GRAHAM, P.C.

P.O. Box 1871

Knoxville, Tennessee 37901

Telephone: (865) 546-4305

Facsimile: (865) 523-4478

CORROSION RESISTANT PRESTRESSED CONCRETE FLOAT SYSTEM

FIELD OF THE INVENTION

This invention relates generally to prestressed concrete flotation structures. More particularly, this invention relates to floating prestressed concrete structures which are more corrosion resistant than conventional floating concrete structures.

BACKGROUND AND SUMMARY OF THE INVENTION

Prestressed concrete floatation structures are well known for use as docks, wharves, and the like. Such structures, such as described in US Patent No. 3,799,093 entitled FLOATING PRESTRESSED CONCRETE WHARF, include a buoyant material, such as expanded polystyrene, a layer of concrete surrounding the buoyant material, reinforcing wire mesh surrounding the buoyant material and located within the concrete layer, and pretensioned steel cables extending through the concrete to maintain it in compression. It has been observed that over time, particularly when the dock or other float structures are used in a saltwater environment, that the cables and wire reinforcing mesh may corrode and weaken the strength of the dock.

With regard to the foregoing, the present invention is directed to corrosion resistant prestressed concrete float units.

In a preferred embodiment, the units include a buoyant core encased within a polymeric coating, concrete encasing the core and polymeric coating, a

corrosion resistant mesh to reinforce the concrete, and a plurality of corrosion resistant pretensioned fiber members extending the entire length of the unit.

In another aspect, the invention relates to a dock system made by interconnecting a plurality of the float units. The units preferably include chaseways for receiving post tensioning members for interconnecting a plurality of the units to provide the dock system.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Further features of preferred embodiments of the invention will become apparent by reference to the detailed description of preferred embodiments when considered in conjunction with the figures, which are not to scale, wherein like reference numbers, indicate like elements through the several views, and wherein,

FIG. 1 is a perspective view of a float system according to a preferred embodiment of the invention, partially cut away to show interior portions thereof.

FIGS. 2A-2F show preferred cross-sectional geometries of float systems according to the invention.

FIG. 3 shows a plurality of the float systems of FIG. 1 arranged to provide a dock system according to a preferred embodiment of the invention.

FIGS. 4A-4B show preferred inclusion of mooring members and the like on the float system.

FIGS. 5A-5B show two examples of dock structures according to the invention.

DETAILED DESCRIPTION

With reference to the drawings, the invention relates to a corrosion resistant prestress concrete float system featuring one or more floating units 10. Each unit 10 preferably has a cross-section configuration as depicted in FIGS. 2A-2F, but  
5 may also be configured to have other cross-sections. A plurality of the units 10 may be arranged as seen in FIG. 3 and FIGS. 5A-5B to provide a floating dock or wharf system 12.

Returning to FIG. 1, each unit 10 is constructed so as to be relatively corrosion resistant when used in a marine environment. This is accomplished in a  
10 preferred embodiment by avoiding the use of components such as steel in the construction of the units 10.

In a preferred embodiment, each unit 10 preferably includes a buoyant core 14 encased within a polymeric coating 16, concrete 18 encasing the core 14 and polymeric coating 16, a corrosion resistant mesh 20 to reinforce the concrete 18, and  
15 a plurality of corrosion resistant pretensioned fiber members 22 extending the entire length of the unit 10. The unit 10 also preferably includes a plurality of chaseways 24 for receiving post tensioning members 26 for interconnecting a plurality of the units 10 in a desired manner. The unit 10 floats in water, with the line W in FIG. 1 generally indicating the water level relative to the unit 10 during use.

20 The core 14 is preferably provided by expanded polystyrene foam or polyurethane foam. The polymeric coating 16 which encases the core 14 is preferably

a polyethylene coating. The coating 16 is preferably roughened to facilitate bonding to the concrete 18, and may be abraded or have appendages, corrugations or the like. The coating 16 inhibits moisture from contacting the core 14 to avoid the core 14 from becoming waterlogged and otherwise deteriorating from exposure to moisture, chemicals, and other substances which tend to deteriorate the core 14. If desired, a vent may be provided between the core 14 and the atmosphere to enable venting of gases that develop. This may be accomplished as by a polymeric tube 27 or the like located to pass from the core and through the coating 16 and concrete 18 to a surface of the concrete, such as a side near the top. The exposed end of the tube is preferably configured to inhibit passage of moisture or other matter back to the core.

The concrete 18 is preferably a lightweight, regular weight, or polymer modified concrete material applied so as to surround the core 14. The corrosion resistant mesh 20 provides reinforcement to strengthen the concrete 18 against loading, environmental changes such as temperature changes, and the like. The mesh 20 is preferably made of carbon fiber, polymeric materials such as polyethylene, glass reinforced plastic, or like materials which are substantially resistant to corrosion in a marine environment and resistant to corrosion in an alkali-concrete environment.

The corrosion resistant pretensioned fiber members 22 are preferably made of materials which are substantially resistant to corrosion in a marine environment and resistant to corrosion in an alkali-concrete environment, such as

carbon fiber strands, kevlar/aramid fiber strands, plain or vinyl ester coated glass fiber strands, polymeric fiber strands, and the like.

5 The chaseways 24 are preferably of extruded polyvinyl construction to provide chaseways that resist corrosion/deterioration in a marine/alkali-concrete environment. The chaseways 24 may preferably be provided as by pvc piping. The chaseways 24 receive the post tensioning members 26, which are preferably formed of similarly non-corrosive materials, most preferably carbon fibers or aramid fibers. The units 10 may preferably be strung on the members 26 to provide a dock or other floating structure.

10 The units 10 are made using a suitable mold and tensioning devices for pouring of the concrete. After the concrete is cured, the fiber members 22 are preferably trimmed to be flush with the exterior of the concrete 18 or the post tensioning member 26 or restraints therefor. An upper or deck surface 28 of the concrete 18 may be brushed during curing to provide a non-slip surface 31.

15 With reference to FIGS. 4A-4B, the concrete may be configured to receive threaded inserts 30 for attachment of mooring cleats 32, with the insert 30 preferably being configured, as by including an aperture, for passage of the pretensioned fiber members 22 or other reinforcement. Likewise, rail member 34, such as a board, preferably having a rubber bumper rail 36 adhered thereto, may be attached  
20 as by bolt 38 which cooperates with the insert 30. The rail member 34 preferably includes an insert portion 39 so that the bolt 38 does not protrude. Also, elastomeric

pads 40 are preferably adhered or otherwise secured to the exteriors of the units 10 for padding between adjacent units.

With reference to FIG. 5A, a plurality of the units 10 are interconnected and extend from a boarding ramp 42 which extends from a bulkhead 44. In FIG. 5B, a floating platform 46 is provided by a plurality of the units 10 arranged side-by-side. In this regard, it is noted that the units 10 may be of a variety of sizes and configurations and may be utilized with other units 10 or other structures to provide a wide variety of floating configurations.

The foregoing description of certain exemplary embodiments of the present invention has been provided for purposes of illustration only, and it is understood that numerous modifications or alterations may be made in and to the illustrated embodiments without departing from the spirit and scope of the invention as defined in the following claims.